

REMARKS

Claims 1-23, as amended, and new claims 31-36 appear in this application for the Examiner's review and consideration. Claims 24-30 have been cancelled without prejudice to applicants' rights to file a divisional application for the subject matter of those claims.

The new claims have been added to cover preferred features of the invention that are shown in the drawings and are discussed in the specification. As no new matter has been introduced, these claims should be entered at this time.

The indication of allowable subject matter in claims 7-14 is noted with appreciation. As claims 17-18 depend from allowable claim 11, these claims are also believed to be allowable.

The objection to the drawing has been overcome by submitting herewith a replacement drawing for Figure 1 that includes the notation "Prior Art."

Claims 1-6, 15-16, and 19-23 were rejected for lack of novelty over US patent 6,436,226 to Omi et al. ("Omi") for the reasons set forth on pages 3-6 of the action. Applicants traverse this rejection, as claim 1 is believed to be novel and unobvious over Omi.

Omi discloses an apparatus for separating a substrate having a porous layer at the porous layer is provided. A bonded substrate stack having a porous layer is supported by substrate holding portions while being rotated. A high-speed, high-pressure water jet is ejected from a nozzle and injected against the bonded substrate stack, thereby physically separating the bonded substrate stack into two substrates. The jet pressure is appropriately changed in accordance with progress of separation processing.

As noted above, the present invention relates to a tool for disuniting two bonded wafers in which the wafers are flexed or bent in a controlled manner while they are being disuniting. The invention makes use of gripper members, preferably made of deformable plates, that are capable of pivoting one relative to the other, and that are sandwiched on the two faces of the structure of bonded wafers to be disuniting. The plates are subject to controlled flexing or bending due to the action of a series of actuators, and the tool makes it possible to control the disuniting force in a manner that is localized, precise, and reproducible.

Claim 1 recites two gripper members for affixing to opposite faces of the wafers that are united together; and a disuniting control device for moving the members relative to each others, the disuniting control device comprising an actuator device for positively displacing the gripper

members away from each other sufficiently for inducing controlled flexing in at least one of the members to assist in disuniting the members.

In contrast, Omi relates to a separating apparatus using a water jet method, and deals more precisely with an appropriate control of the jet pressure during the separation process (see abstract; ‘summary of the invention’; col. 5, l. 40-65; col. 10, l. 40-44; col. 12, l. 10-15, l. 39-43). Omi's separating apparatus comprises means for rotating the structure to be disunited (that is the two bonded wafers, referred to as ‘bonded substrate stack’) while the jet is injected against the structure. The separating apparatus according to Omi comprises two gripper members for temporarily affixing to respective opposite faces of the wafers that are united together (substrate holding portions 108 and 109 having vacuum chuck mechanisms 108a and 109a), and a disuniting control device (motors 110 and 111) is used to rotate the gripper members. Indeed each substrate holding portion 108, 109 is coupled to one end of a rotary shaft 106, 107. The other end of each rotary shaft 106, 107 is fixed to a driving source (motor 110, 111). The rotational force generated by the driving source 110, 111 rotates the bonded substrate stack 101 vacuum-chucked by the substrate holding portions 108, 109 (see col. 7, l. 31-61).

It is respectfully submitted that Omi is non-analogous art to the present invention, because Omi relates to a cutting technique that is totally different from that which is presently claimed. Omi proposes to inject fluid in between the wafers while the present invention proposes to control the bending of the wafers while they are being disunited. Omi fails to disclose that the gripper members (or substrate holding portions) are moved relative to each other and in particular away from each other by pivoting. On the contrary, Omi envisages that the gripper members “integrally rotate” (see col. 7, l. 48-52 and l. 54-59). Instead, Omi provides rotation of the entire structure to be disunited, with the two opposite faces of the wafers being rotated at the same speed. In the apparatus according to Omi, both rotary shafts rotate at the same speed so as “to prevent the bonded substrate stack from twisting” (col. 7, l. 48-52). There is no pivoting or other rotation of one holding portion with respect to the other one.

Furthermore, the rotary shaft according to Omi does not induce controlled flexing or any other bending of the corresponding holding portions. Instead, the rotary shaft induces rotation of the whole gripper member, but does not enable different amounts of curvature to be given to different regions of the wafers. Thus, Omi fails to disclose a disuniting control device comprising at least an actuator device for positively displacing the gripper members away from

each other sufficiently for inducing controlled flexing in at least one of the members to assist in disuniting the members.

In view of the preceding discussion, the anticipation rejection based on Omi has been overcome and should be withdrawn.

In addition, the present claims are not obvious from Omi's disclosure. The present invention seeks to mitigate the limitations of the prior art techniques, of which a wafer jet splitting methods, such as the one disclosed in Omi, is a well known technique. Contrary to what Omi discloses, the presently claimed invention uses a controlled bending of the plates and thus of the wafers while they are being disuniting to achieve unexpected benefits. First of all, this flexing or bending enables the process to achieve various advantages as set forth in paragraphs [0057], [0059], [0061], [0078] and [0081] of the published application. These advantages support the patentability of the claims.

Moreover, applicants note that Omi teaches away from the invention in that it considers it to be essential to prevent the bonded substrate stack from twisting, whereas the present process pivots the gripping members away from each other to assist in disuniting of the wafers.

In view of the above, it is believed that claims 1-23 are in condition for allowance, early notice of which would be appreciated. Should the Examiner not agree, then a telephonic or personal interview is respectfully requested to discuss any remaining issues and expedite the eventual allowance of the claims.

Date: 1/23/06

Respectfully submitted,



Allan A. Fanucci (Reg. No. 30,256)

WINSTON & STRAWN LLP
CUSTOMER NO. 28765
(212) 294-3311